AMENDMENTS TO SPECIFICATIONS

Please amend the Specification as per the following:

TITLE PAGE

TITLE
Pg. 1 line 1

IMPROVED SLIDINGLY ENGAGABLE FASTENERS and METHOD ~~OF MANUFACTURING SAME~~

PRIORITY

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~~Ref Provisional patent applications~~

~~60/228,780 05/05/2001~~

~~60/241,707 10/19/2000~~

A1

This application claims the benefit of US Provisional Applications No. 60/288,780 filed 05/05/2001 and No. 60/241,707 filed 10/19/2000 in regard to Priority status as provided under 35 USC 119 (e)(1).

SPECIFICATION

SUMMARY OF THE INVENTION

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Embodiments include examples of several types of Improved SEF: a multi-directional SEF arrayed in a quadrille pattern which aligns portions at 90 degree radial intervals and provides resistance to shear stresses of any orientation; a multi-directional portion arrayed in an alternating triangular pattern which aligns portions at 120 degree radial intervals and also provides multi directional shear resistance; a multi-directional portion arrayed in a hexagonal pattern which aligns portions at 60 degree radial intervals and provides multi-directional shear resistance; a uni-directional portion with islands and apertures arrayed in ~~a triangular pattern~~--***bilateral disposition***--; a double-sided embodiment which includes two active fastening faces on opposite sides of a common base structure thereby allowing the portion to be attached to separate complementary portions or to be doubled back and attached to itself at another location; a double-sided embodiment having a chevron configuration which provides uni-directional connection to portions on opposite sides; and an example of a product of which such improved fasteners are an integral part. Each of these embodiments are intended to schematically illustrate a range of design options and aspects which generally can be mixed or substituted within the scope of the invention. Embodiments include SEF portions which are molded and have differential profile thickness as well as other embodiments having a relatively consistent profile thickness which may be either molded or formed of a sheet material. Any of the embodiments illustrated can be molded or formed integrally with a primary product or component.

DESCRIPTION

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Fig. 1A schematically illustrates a one portion of a first preferred embodiment 01, an Improved Slidingly Engagable Fastener of a quadrille design which includes two substantially identical such portions designed to fasten and interlock with each other upon application of a relative shearing force. Each such portion includes a base 02 with a first basal surface 15 and a plurality of undercut segments 09 which are spaced from the basal surface. At least the second such portion also includes a base 02 with a basal surface 15 having a plurality of fenestrations 03, and also includes a plurality of stems 07 each with a first end attached to the base and extending away from the base and attached to an undercut segment 09 which in turn extends away from the stem so as to effectively provide an undercut island 04 with at least one underside 10 spaced away from said basal surface. Such a configuration therefore provides at least one aperture 11 which is defined by the undersides 10 of two adjacent islands and the stems 07 which connect the islands with said base in such a spaced disposition. ***--It can be seen that each such set of two adjacent islands are bilaterally disposed about an axis generally bisecting an intervening aperture; and the edges of such islands diverge from such axis so as to provide an aperture opening larger in at least one dimension than the leading edge of an associated island so as to present a generally tapered aspect in plane view. Therefore, a quadrille design of the type shown in Fig. 1 is arrayed along a longitudinal axis of anticipated shear which is generally diagonal to the nominally square shape defined by the island edges (diamond pattern in plane view) so as to effect such a tapered disposition for engagement. However it should also be understood that portions may be effectively connected, though not fully interlocked, when undersides are slidingly interfaced on an axis generally aligned with this generally square shape(diagonal to the primary axis).--***

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Each portion 01 may also include a plurality of said islands 04, each having a top surface 05 with an associated edge 06, a stem segment 07 with sidewalls 08, and undercut segments 09 with undersides 10, wherein said edge and said undersides are also

sidewalls, and further wherein said undersides are aligned, in a direction generally perpendicular to the plane of said common base structure, with at least portions of –*individual*—said perforations. It should be noted that in this and other embodiments, said stems 07 are generally located between said undercut segments, and vice versa so as to effect an island having a top surface 05 with a segmented edge 06. -- ***In this instance, each such stem can be seen to be associated with four such undercut segments in that they are contiguous with such segments.***-- A plurality of apertures 11 may also be included in said portion 01, each said aperture having an associated aperture opening 12, and walls 13: wherein said aperture opening is defined by said associated edge 06 of each adjacent island 04, and wherein segments of said walls are coincident with segments of said sidewalls 08 and other segments of said walls are coincident with segments of said undersides 10. The portions are designed so that ones of said apertures receive ones of said islands so that, when two such portions are aligned (i.e. ones of islands are inserted through corresponding aperture openings) and are slidingly engaged by a relative shearing force, said first and second portions become connected and interlocked. Such interlocked portions may subsequently be disconnected by reversing said relative shearing force or, when the base of at least one portion is sufficiently flexible, the portions may be sequentially peeled apart.

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Embodiments of the type 01 illustrated in Fig. 1 –,***wherein one stem is associated with three or more undersides,***–are designed to be manufactured of a moldable material utilizing a method incorporating a set of interengaging dies associated with an apparatus which is described below. Therefore, this type of embodiment may include a variable cross-sectional dimension, whereas other types of embodiments, as seen below, may have a relatively consistent cross-sectional dimension and therefore may be manufactured of either a moldable material or of a malleable material by utilizing such method with dies and apparatus of an appropriate design. Such molded embodiments may also include an optional integrally molded reinforcement 48.

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In this type of embodiment 20, each said island 04 has a plurality of said stems 07,-- ***each such stem associated with just two adjacent undercut segments,***-- and said islands and said common base structure 02 have a generally consistent thickness, so that such a portion may be produced either by molding a moldable substance as in the previously described embodiment or by perforating and forming a malleable sheet material utilizing said method incorporating said interengaging dies and said apparatus.

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A third preferred embodiment 21, illustrated in Fig. 3, also includes a fenestrated base structure 02 with perforations 03, islands 04, complementary apertures 11 and other aspects as in the previous embodiments. This embodiment, however, is configured in a hexagonal design with islands having a generally hexagonal shape arrayed in offset rows and columns so as to define a multiplicity of apertures associated with each island at 60 degree radial intervals thereby allowing engagement of two portions of such an embodiment at such 60 degree radial intervals. Each island 04 therefore corresponds with six aperture openings 12 defined by adjacent sets of three such islands, whereas each of three undercut segments 09 is included between each of three stem segments 07-- ***-and each stem is associated with three undercut segments 03 so as to provide undercut segments extending beyond each of the six sides***--. It is apparent that multi-directional embodiments such as this could also include additional divisions of stem and undercut segments, for instance the present embodiment could alternatively include six stems and corresponding undercut segments, etc.

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A fourth preferred embodiment, illustrated in Fig. 4, includes an improved slidingly engagable fastener portion 23 having a plurality of triangular islands arrayed in offset rows so as to provide a uni-directionally oriented, longitudinally adjustable fastener. As in the embodiments described above, each portion includes pluralities of islands 04 and complementary apertures 11 associated with a fenestrated common base structure 02. In this type of embodiment 23, each of said islands includes stem segments 07 with

sidewalls 08 and also includes undercut segments 09 with undersides--***10***--, said stem segments and undercut segments being ~~configured~~ –***bilaterally disposed***— so as to define one of said apertures 11 between each pair of adjacent islands designed to receive and engage one island in a directionally opposite orientation. –***(The term "bilaterally disposed", as used herein, is intended to define pairs of undersides ((associated with islands)) which are generally bilateral in plane view about a longitudinal axis of anticipated shear. It can be appreciated that adjacent pairs of undersides in each embodiment of the invention are thus "bilaterally disposed", but that in uni-directional embodiments such as in Figs. 4, 5 and 6 islands can be said to be bilaterally disposed only, whereas in multi-directional embodiments such as in Figs. 1, 2, and 3 sets of undersides ((islands)) may also be said to be disposed in other pluralities).*** –One of each of said stem segments 07 of each said island 04 of this embodiment also provides a stopping wall 25 which is designed to prevent ones of said islands from inadvertently being removed from a pre-engaged disposition when an assembly of said portions is subjected to flexure or to a reversal of said relative shearing force, unless a perpendicular peeling force is also applied. Therefore said fastener portion 23 is designed to primarily resist shear stresses oriented in a single direction and will also resist inadvertent release when said shear stresses are reduced or absent, unless such a perpendicular peeling force is also applied. Such uni-directional fasteners may be designed to provide superior shear and tensile (vertical) strength for applications where only uni-directional stresses are expected, and also to provide relative ease of release by peeling.

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A fifth preferred embodiment 25, illustrated in Fig. 5, includes a plurality of —***bilaterally disposed***—islands 04 configured in a uni-directional orientation in which said islands are contiguous with a common fenestrated base structure 02, said fenestrated base structure being stepped in profile at each alternate row of said islands so as to provide apertures between such islands. Said islands and apertures are arrayed in rows so that a first surface 15 of said common base structure 02 in a first row is substantially coplanar with the top surface of said island tops 05 of a subsequent adjacent second row, and a second surface 19 of said fenestrated common base structure 02 in such a first row is coplanar

with ones of said undersides 10 of said islands of said subsequent adjacent row; whereas said first and second surfaces are not coplanar with corresponding islands and apertures of a third adjacent row but are rather spaced from them by a distance equal to one of the aforementioned steps. Said stems 07 connecting said base structure 02 with said islands 05 thereby effect the aforementioned stepped profile and provide structural continuity to the whole–, ***each stem being associated with two laterally adjacent undersides (except at outer edges of the portion)***–. Therefore, a first said fastener portion 25 can be attached to a like portion 25 in opposed disposition, or it can be attached to a further portion of itself when doubled or folded into such a position. It is noted that the term "coplanar" as utilized herein is intended as a relative term not intended to preclude twisting or flexing of the whole or any element thereof. A significant aspect of this type of embodiment is that it can be readily produced of virtually any malleable sheet material by the method herein described using a set of cutting/bending dies in a relatively simple apparatus. Such materials may include sheet metal, paper, cardboard, composite materials, thermoformable plastics, or other sheet materials. Another significant aspect is that this embodiment provides a very low-profile, thus a fully engaged fastener may be only twice the thickness of its base structure. Therefore a wide range of versatile, low-cost, self-aligning, self-attaching, low-profile fastening products is provided which may be utilized for packaging sanitary disposable products and other applications.

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A sixth preferred embodiment 29, which is illustrated as the end segments of –*a*—strap, is shown in Fig. 6. Said embodiment 29 includes a plurality of islands 04 and a plurality of complementary apertures 11 each configured in a chevron configuration on both the first 30 and second 31 sides of common fenestrated base structure 02. Said islands on said first side 30 being configured in a first directional orientation, and said islands on said second side 31 being configured in a second directional orientation; so that the walls 13 of a plurality of said apertures 11 of complementary orientation are defined by said sidewalls 08 of said stem segments 07 and by said undersides 10 of said undercut segments 09 in each of two complementary directional orientations. Therefore, said islands of said first side 30 of said portion 29 may be slidingly engaged with apertures of

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said second side 31 of a similar portion and vice versa, thereby providing a double-sided self-connecting linear fastener.

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Fig. 10 schematically illustrates fastener portions 20 which are part of a primary product 42, illustrated as a molded strap. Said product 42 is designed to include said fastener portions as an integral part of said product so that when said product is folded toward itself said first and second portions may be adjustably fastened. Said product may include a first portion 44 configured in an upward facing arrangement, and a second portion 45 configured in a downward facing arrangement as illustrated, or may comprise both fastener portions configured in like arrangements. Said product 42 may also optionally comprise a component having a third portion spaced from a fourth portion, wherein the first portion 44 is contained in said third portion and the second portion 45 is contained in said fourth portion. Said product 42 may include an optional elastic segment 46, designed to allow said second part 45 to be stretched prior to fastening so as to provide said relative shearing force as needed to slidingly engage the portions by the inherent elasticity of said ~~resilient~~ ***--elastic***—segment. It is important to note that virtually any type of improved slidingly engagable fastener may be readily substituted in a product in lieu of the triangular design illustrated. Likewise, it should be noted that a slidingly engagable fastener portion may be integrally molded or formed as part of a wide variety of primary products or components, and that such fastener portions may be utilized for component assembly or as a functional sub-part of such a product or component.

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